

5 c) thereafter, maintaining said plasma to deposit a first layer of said film
6 over said substrate without biasing said plasma toward said substrate; and

7 d) thereafter, maintaining said plasma and biasing said plasma toward said
8 substrate to deposit a second layer of said film over said first layer.

1 17. (AMENDED) A **[high-density plasma chemical vapor deposition]**
2 substrate processing system comprising:

3 a housing for forming a vacuum chamber;

4 a vacuum pump for evacuating said vacuum chamber;

5 a pedestal, located within said housing, **[for holding]** configured to hold a
6 **[semiconductor]** substrate;

7 a gas distribution system fluidly coupled to **[for introducing a process gas**
8 **into]** said vacuum chamber;

9 a plasma generation system for **[creating an inductively coupled]** forming a
10 plasma from **[said]** process gas within said vacuum chamber and for selectively biasing said
11 plasma toward said substrate **[to enhance sputtering];**

12 a controller for controlling said vacuum pump, said gas distribution system and
13 said plasma generation system;

14 a memory coupled to said controller and storing a program for directing the
15 operation of said system, said program including a set of instructions for depositing a **[stress-**
16 **reduced]** film by

17 first, controlling said gas distribution system to introduce said process
18 gas into said chamber;

19 second, controlling said plasma generation system to **[apply RF power**
20 **to said inductively coupled coil to]** form a plasma from said process gas and deposit a first
21 layer of said film over said substrate without biasing said plasma towards said substrate; and

22 third, controlling said plasma generation system to maintain said LAB
23 inductively coupled plasma and bias said plasma toward said substrate[, **thereby promoting a**
24 **sputtering effect of said plasma and depositing]** to deposit a second layer of said film over
25 said first layer.

1 18. (AMENDED) The **[apparatus]** substrate processing system of claim 17
2 wherein said program further includes instructions for depositing a plurality of said first layers
3 and said second layers by
4 fourth, depositing a third layer of said film over said second layer by
5 controlling said plasma generation system to maintain said **[inductively coupled]** plasma and
6 stop biasing said plasma toward said substrate;
7 fifth, depositing a fourth layer of said film over said third layer by
8 controlling said plasma generation system to maintain said **[inductively coupled]** plasma and
9 bias said plasma toward said substrate[, thereby promoting a sputtering effect of said plasma];
10 and
11 sixth, performing the second and third steps iteratively at least once until
12 a desired thickness of said film is reached.

1 19. (UNCHANGED) The apparatus of claim 17 wherein said gas
2 distribution system **[is adapted to introduce a process gas comprising silicon and oxygen**
3 **into said chamber]** includes sources of silicon and oxygen fluidly coupled to said gas
4 distribution system.

1 20. (UNCHANGED) A high-density plasma chemical vapor deposition
2 system comprising:
3 a housing for forming a vacuum chamber;
4 a pedestal, located within said housing, for holding a [semiconductor] substrate;
5 means for introducing reactants into said vacuum chamber, [said reactants
6 including silicon and oxygen];
7 means for generating [an inductively coupled] a plasma from said reactants to
8 deposit a first layer of a [silicon oxide] film on said [semiconductor] substrate during a first
9 time period, said first layer for the reduction of mechanical stress in a subsequently deposited
10 layer of a silicon oxide film; and

11 means for biasing said plasma toward said substrate during a second time period
12 after said first time period to enhance a sputtering of said plasma and deposit said subsequent
13 layer.

1 21. (UNCHANGED) The apparatus of claim 20, further comprising means
2 for maintaining a pressure of between about 0.001-10 torr in said vacuum chamber while said
3 films are deposited.

1 22. (UNCHANGED) The apparatus of claim 20, further comprising means
2 for maintaining a wafer temperature of between about 100-500°C in said vacuum chamber
3 while said films are deposited.

1 23. (UNCHANGED) An integrated circuit formed on a semiconductor
2 substrate, said integrated circuit comprising:

3 (a) a plurality of active devices formed in said semiconductor substrate;
4 (b) at least one metal layer formed above said semiconductor substrate; and
5 (c) at least one insulating layer formed between said metal layer and said
6 semiconductor substrate, said insulating layer having a plurality of patterned holes filled with
7 electrically conductive material to electrically connect selected portions of said metal layer to
8 selected portions of said semiconductor substrate, wherein said insulating layer comprises a
9 first silicon oxide layer and a second silicon oxide layer, said first and said second silicon
10 oxide layers deposited using a high-density plasma chemical vapor deposition process, said
11 first silicon oxide layer deposited for the reduction of mechanical stress in said second silicon
12 oxide layer.

1 24. (UNCHANGED) The integrated circuit of claim 23, further comprising:

2 (d) a second metal layer formed above said semiconductor substrate and
3 below said at least one insulating layer;

4 (e) a second insulating layer formed between said second metal layer and
5 said semiconductor substrate, said second insulating layer having a second plurality of
6 patterned holes filled with electrically conductive material to electrically connect selected
7 portions of said second metal layer to selected areas of said plurality of active devices.

Please add claims 25-35 as follows

1 --25. (NEW) The substrate processing system of claim 17 wherein said
2 plasma is an inductively coupled plasma.

1 26. (NEW) The substrate processing system of claim 25 wherein said
2 inductively coupled plasma is formed said process gas using only RF energy applied to a coil
3 disposed about the processing chamber.

1 27. (NEW) The substrate processing system of claim 25 wherein said
2 substrate processing chamber is a high-density plasma chemical vapor deposition chamber and
3 said inductively coupled plasma is a high density plasma.

1 28. (NEW) The substrate processing system of claim 27 wherein the
2 substrate is disposed on said second electrode and electric energy is applied to said first and
3 second electrodes while maintaining the application of said RF energy.

1 29. (NEW) The substrate processing system of claim 17 wherein said
2 process gas introduced by said gas distribution system includes flows of silicon and oxygen.

1 30. (NEW) The processing system of claim 17 wherein said plasma
2 generating system includes a first electrode, a second electrode, and a coil disposed about the
3 vacuum chamber, wherein said pedestal includes said second electrode.

1 31. (NEW) The substrate processing system of claim 19 wherein said source
2 of silicon contains silane.

1 32. (NEW) A computer readable storage medium having program code
2 embodied therein, said program code for controlling a substrate processing system, wherein
3 said substrate processing system includes a processing chamber, a gas delivery system, a
4 plasma generation system and a controller configured to control the gas delivery system and
5 the plasma generation system said program code controlling the semiconductor processing
6 system to process a wafer in the chamber in accordance with the following:

- 7 (i) a first set of computer instructions for controlling the gas
8 delivery system to introduce a process gas into the processing chamber;
9 (ii) a second set of computer instructions for controlling the plasma
10 generation system to form a plasma from the process gas to deposit a first layer over a
11 substrate without biasing said plasma towards said substrate; and
12 (iii) a third set of computer instructions for controlling said plasma
13 generation system to maintain said inductively coupled plasma and to bias said plasma
14 toward said substrate to deposit a second layer of said film over said first layer.

1 33. (NEW) The computer readable storage medium of claim 32, wherein
2 said plasma is an inductively coupled plasma.

1 34. (NEW) The computer readable storage medium of claim 33 wherein said
2 substrate processing system is a high density plasma system.

1 35. (NEW) The computer readable storage medium of claim 32 wherein said
2 process gas includes flows of silicon and oxygen.--

REMARKS

Claim 16 has been amended to recite an integrated circuit made by the process of allowed claim 33 of U.S. Patent Application Serial No. 08/623,445, which is the parent of the present application. Furthermore claims 17 and 20 have been amended to recite apparatus for carrying out the process of allowed claim 33 of the parent application. Applicants have also added, inter alia, claim 35, which recites a computer readable storage medium containing computer readable instructions for carrying out the process of allowed claim 33 of the parent application. Allowed claim 33 of the parent application reads as follows:

33. A process for depositing a film on a substrate disposed in a substrate processing chamber, said process comprising:

- a) flowing a process gas into said substrate processing chamber;
- b) forming a plasma from said process gas;
- c) thereafter, maintaining said plasma to deposit a first layer of said film over said substrate without biasing said plasma toward said substrate; and